Matthew McRaven

Georgetown M.S. student in Computer Science, Research Assistant

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Matthew-McRaven

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Languages

- C/C++
- QMake
- LaTex
- Python
- Bash
- Java
- x86 assembly basics

Frameworks & Libraries

- Qt
- POCO
- Boost (namely Beast, ASIO)
- Flatbufs & Protobufs
- OpenCV

Tools

- Proficient in ⊞ 🐧 🍎
- Git
- Qt Creator
- MS Visual Studio
- Klee
- MS Office Suite
- Slack

Working Experience

2018 – Present **Research Programmer using Qt/C++** Collaboration with Pepperdine University

- ★ Designed CISC processor (Pep/9) and a corresponding graphical processor simulator.
- ★ Improved ISA simulation performance by 600× (written in C++).
- Designed new processor architecture (and simulators at various abstraction levels) named Pep/10, featuring a linking macro-assembler.
- Rewrote 4 applications to utilize common code base.
- Created object code loader (in assembler) for Pep/10 operating system.

2019 – Present **Research Assistant using Python/Javascript** Georgetown University

- ★ Helped design architecture for real-time network traffic capture and analysis using Python.
- ★ Debugged issue in Python pipes causing lost data, prompting new traffic capture architecture.
- Built visualization tool for network traffic flow using Python, Flask, and D3.js.
- Automated deployment of Tor bridges using Docker.

2015 – 2019 **Software Developer using C++/Qt/Boost** SabrixTax LLC

- ★ Prototyped multi-connection HTTP software router with dynamic routing rules for tax computations using C++/Boost.
- ★ Automated cross-platform deployment of all SabrixTax applications.
- Released multi-threaded HTTP client for replaying tax computations.
- Compressed network traffic via Google's flatbuffers and protobufs.
- Built performant C++ unit testing tool via Excel add-in (XLL).
- Refactored existing Qt/C++ applications to use common code base.

Education

2019 – 2021 (expected) **M.S. in Computer Science** Georgetown University
Took (or currently taking) courses in Current GPA 3.89 / 4.00
Computer Architecture, Verification, Network Security.
Designed chat client-server, website fingerprinting using Python.

2015 – 2019 **B.S. in Computer Science/Mathematics** Pepperdine University
Graduated *Magna Cum Laude*. GPA 3.73 / 4.00
Took courses in Computer Systems, Organization, Operating Systems, Automata Theory.

Awards / Presentations

2019 – present **Computer Science Merit Scholarship** Georgetown University
Awarded to top 10% of incoming M.S. students.

2019 **Computer Science Student of the Year** Pepperdine University
Choosen as top C.S. student of the class of 2019.

2017 – 2019 **Northrop Grumman Scholarship** Pepperdine University
Awarded to top C.S. students at Pepperdine

2018 **Pep9Micro: Designing a Microcoded CPU** SCCUR
Poster presentation on designing a new pedagogical processor.

Extra-Curricular Activities

2015 – 2019	Child Program Volunteering	Pacific Palisades Cavalry Church
2013 – 2014	Math Tutor	Tigard High School
2012 – 2015	Martial Arts Instructor	Family Martial Arts Academy

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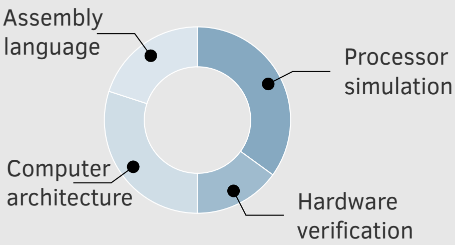
Research Interests



Developing Skills

- Verilog
- SoC Communication Architectures
- Binary Code Analysis
- PyTorch

Hobbies

Hiking
Photography
Matthew McRaven
Gaming on my 1080ti
Travel
Cooking

Research / Projects

2019 – present **Pep/10** Pepperdine University

Pep/10 is an in-development suite of tools to teach assembly language & computer organization concepts. It is a revision of Pep/9 featuring a macro-enabled assembly language.

★ Developed multi-pass assembler tool-chain to handle static linking and macro expansion.
- Designed a recursive-descent parser for the new macro-enabled assembly language.
- Created automated regression tests to evaluate the reliability of new assembler tool-chain.
- Automated deployment/unit-testing via GitHub Actions.

2019 – present **Symbolic Verification of Pep/9** Georgetown University

Pep9Milli is a hardware verification effort targeting the Pep/9 processor.

★ Verified that 75% of the Pep/9 CPU hardware/microcode adheres to its RTL specification.
- Introduced a new hardware control language for Pep/9, *millicode*, that is easier to teach and debug than existing microcode.
- Perform symbolic execution (using `Klee`) on millicode to verify processor correctness.
- Paper publication describing verification effort is in progress.

2018 – present **Pep/9** Pepperdine University

Pep/9 is a deployed tool suite to teach assembly language & computer organization concepts. Designed & built a hardware implementation of the Pep/9 processor.

★ Designed microcode/hardware implementation of the Pep/9 processor.
★ Developed unified graphical microcode/ISA simulator, named `Pep9Micro`.
- Implemented advanced assembly debugging features in ISA-level simulators, such as step into, over, & out of functions.
- Created a terminal interface to the Pep/9 system, allowing for automated instructor grading of programming assignments.
- Automated deployment on Windows, Mac OS, and Ubuntu.
- Rewrote existing (`Pep9` & `Pep9CPU`) applications to promote code reuse.